

## ABSTRACT

A device for determining a location of an interface between a first fluid and second fluid includes a non-mechanical sensor that measures a selected parameter of interest relating to the fluid surrounding the sensor ("the surrounding fluid") and a processor for processing the sensor measurements.

- 5 The non-mechanical sensor measures a parameter relating to the surround fluid without physically co-acting with the surrounding fluid. Exemplary parameters such as thermal properties, electrical properties, fluid properties, and magnetic properties can be measured. The processor is programmed to process the
- 10 sensor measurements to identify one or more characteristics in the measurements that can indicate the nature of the fluid being measured and thereby determine the location of the interface. The determined location can be used to operate a downhole device such as a pump, to provide real-time monitoring of well conditions, to record data for long-term reservoir characterization, or to actuate an alarm.

15